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WESTERN LETTUCE - AN INDUSTRY IN TRANSITION

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WESTERN LETTUCE -- AN INDUSTRY IN TRANSITION

by

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SUMMARY

1. Since 1920 the lettuce industry has developed into one of the most important vegetable industries in the Unites States. In 1955, lettuce accounted for 17.6 per cent of the total farm value of all vegetables.
2. In 1954, Arizona and California accounted for 78.4 percent of all commercial lettuce produced.
3. Since 1928 the Salinas-Watsonville-Hollister district has accounted for approximately 50 per cent of all commercial lettuce shipments.
4. Trends for acreage, yield, production, and shipments are upward, showing the increasing demand for lettuce.
5. Lettuce is produced and shipped in every month of the year.
6. Shifts in the lettuce industry have been of three types (1) shifts within specific producing districts, (2) shifts between producing districts, and (3) shifts to new areas of production.
7. Blythe and Texas are two new major lettuce producing districts.
8. Approximately 90 per cent of the lettuce is field harvested, packed into paperboard cartons and vacuum cooled.
9. A saving of approximately 32 cents per carton results from the new methods of harvesting, packing, and cooling.
10. Truck shipments of lettuce are increasing, yet the railroads are the major transportation facility of Western lettuce.
11. New York, Chicago, and Philadelphia are the three largest markets for lettuce.

12. Lettuce produced in regions other than the Western region is largely consumed within that region.

13. As income increases 1.0 per cent lettuce consumption increases .67 per cent.

14. Paperboard and fiberboard carton containers have virtually replaced the old wooden crates.

15. Standard containers are being limited to two in California and Arizona. One 14 1/4" x 18 1/4" x 20 1/2" of wood and nail construction, the other 9 3/4" x 14" x 21" of fiberboard construction.

16. The cost of harvesting, packing, cooling, and loading is less when using cartons than crates.

17. There is less breakage and damage to both container and lettuce when shipped in cartons or crates as dry-packs.

18. For the 10 years 1945-1954 shipments show little relative fluctuation from the mean of the period.

19. Price fluctuation from the mean of the 10 years 1945-1954 was found to be more than that for shipments, ranging from 20.3 per cent for the California spring season to 15.7 per cent. For Arizona the range was from 26.0 per cent for the fall season to 15.4 per cent for the spring season.

20. Price trends for all seasonal groups have been slightly upward, with two distinct levels. One level was the period 1930-1940, the other was 1943-1954.

21. The highest average price per crate has been the spring season with $2.47, followed by the fall $2.30, winter $2.26, and the summer $2.22.

WESTERN LETTUCE -- AN INDUSTRY IN TRANSITION

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INTRODUCTION

The Problem

The western lettuce industry is in a transitional period. Many inovations with far-reaching effects have occurred in all phases of the industry.

In recent years a change in packaging for shipment from ice-packed wooden crates to vacuum cooled fiberboard cartons has taken place. This change has been accompanied by a change in the location of packing activity from shed to field.

Other changes are occurring, such as shifts in timing of harvest in the various producing areas. With these shifts have come seasonal changes in the relative importance of the producing districts based on the volume of lettuce shipped.

Development and Importance of the Western Lettuce Industry

Since 1920 the lettuce industry has developed into one of the most important vegetable industries in the United States. In 1920 the total farm value of all vegetables produced for fresh market was 123.5 million dollars. Of this amount, lettuce accounted for 11.7 million or 9.5 per cent. In 1955 lettuce accounted for 138.9 million dollars out of a total farm value of 786.4 million for all vegetables, or 17.6 per cent, and 12 times the dollar value of lettuce in 1920.

1/ Research Associate, Department of Agricultural Economics, Arizona Agricultural Experiment Station, University of Arizona, Tucson. Assistance in planning and conducting this study was given by R. E. Seltzer, Economist, and R. S. McGlothlin, Assistant Economist of the Arizona Agricultural Experiment Station. Some of the data used were made available by J. S. Hillman, Associate Economist, presently on leave to Brazil.

Among the factors responsible for this growth are: (1) the changing dietary habits of the consumer, resulting from the current emphasis on non-fat foods, (2) increased standard of living, allowing the consumer to buy foods once considered a luxury, (3) fewer hours of manual labor, thereby, reducing the need for high energy foods, (4) increased population, (5) new lettuce varieties, and (6) technological innovations such as improved packaging, harvesting, and transportation methods.

Figure 1 shows the development of the industry from 1920 to 1954. Since 1920 total acreage has increased 533 per cent, harvested production 425 per cent, and shipments 460 per cent. These increases would be more nearly equal in magnitude if total production and locally consumed lettuce shipments were included.

In the early 1900's several eastern states were prominent in lettuce production. However, since 1920 production in these states has remained stable or has decreased and is of little relative importance.

The major developments have occurred in the southwestern United States where factors are favorable to lettuce production. In 1918, states other than California and Arizona produced 53.5 per cent of all commercial lettuce. In 1935 it was down to 16.5 per cent, and 1954, it held at 21.6 per cent.

Trends by Area of Production

In 1954 six areas in California, Arizona, and Texas shipped 98.9 per cent of all carlot lettuce shipments. For the same year these areas accounted for 83.1 per cent of total commercial lettuce production. The difference between shipments and production is partially accounted for by the fact that in some of the minor areas lettuce is produced near large centers of population and is consumed locally.

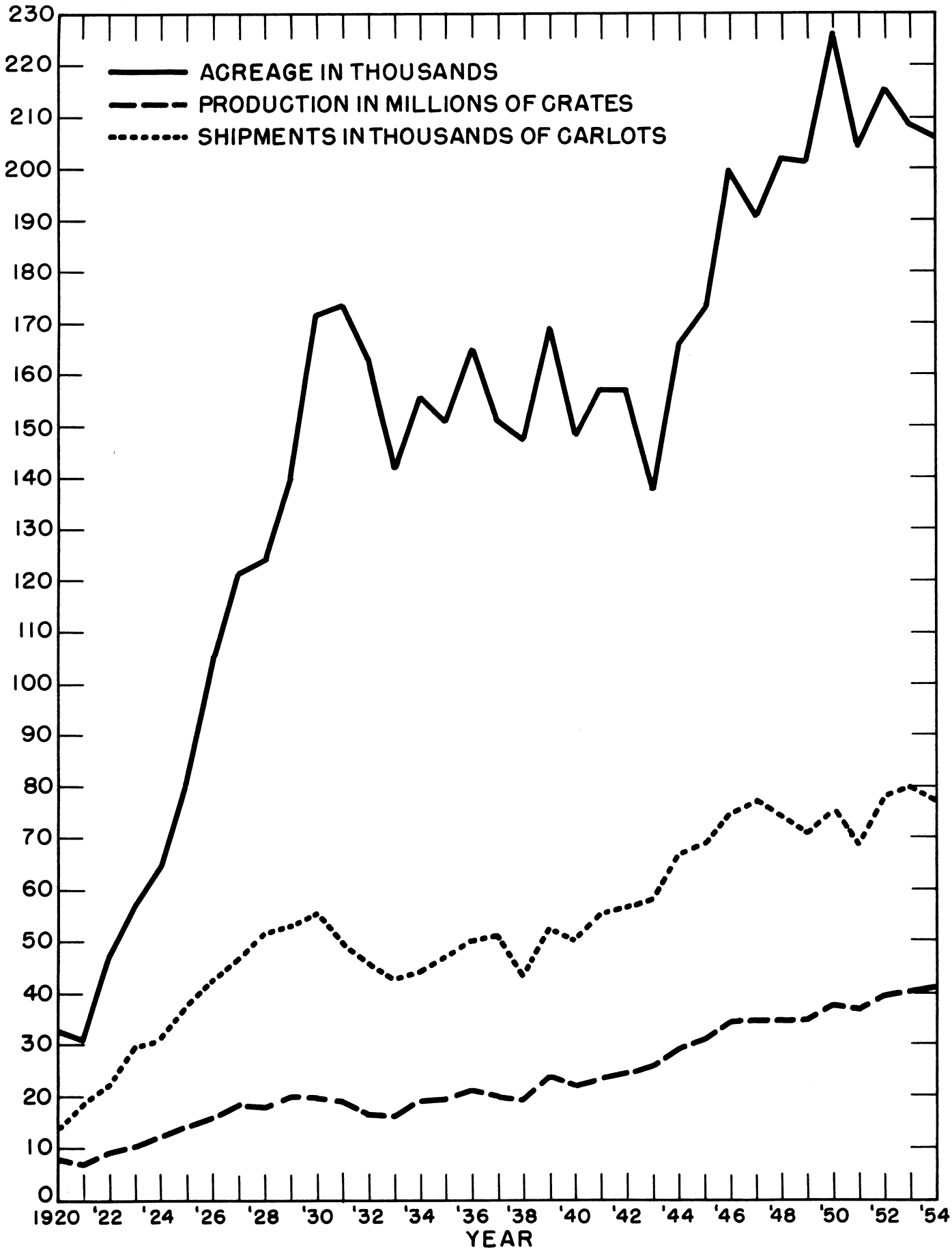

Figure 1:— Total acreage, production and shipments, United States 1920-1954.

Salinas-Watsonville-Hollister

This district in California is the largest lettuce producing and shipping district in the United States. Since 1928 this district has accounted for approximately 50 per cent of the commercial lettuce shipments in the United States.

Figure 2 shows the trends for acreage, yields, production, and shipments for the years 1928-1954. From the figure it is readily noted that all the trends have been upward. However, production and shipments show the most rapid increases with acreage slightly upward.

Imperial Valley

The Imperial Valley is possibly the oldest lettuce producing district of any importance in the United States. This district grew rapidly during the early years of development and expansion, but soon was surpassed by other district.

Figure 3 shows the trend for acreage, yield, production, and shipments. During the early 1930's the Imperial Valley district reached a low in yields per acre. However, shipments and production were kept at a high level because of high acreage.

Blythe

This district usually designated as a part of the Southern California area, has in recent years expanded lettuce production to a point where it now demands the attention of producers in competitive areas. Figure 4 shows the average weekly carlot shipments from the Blythe district. This figure also shows the rapidity with which this district has developed.

Salt River Valley

This district is the principal lettuce producing district in Arizona and is second to

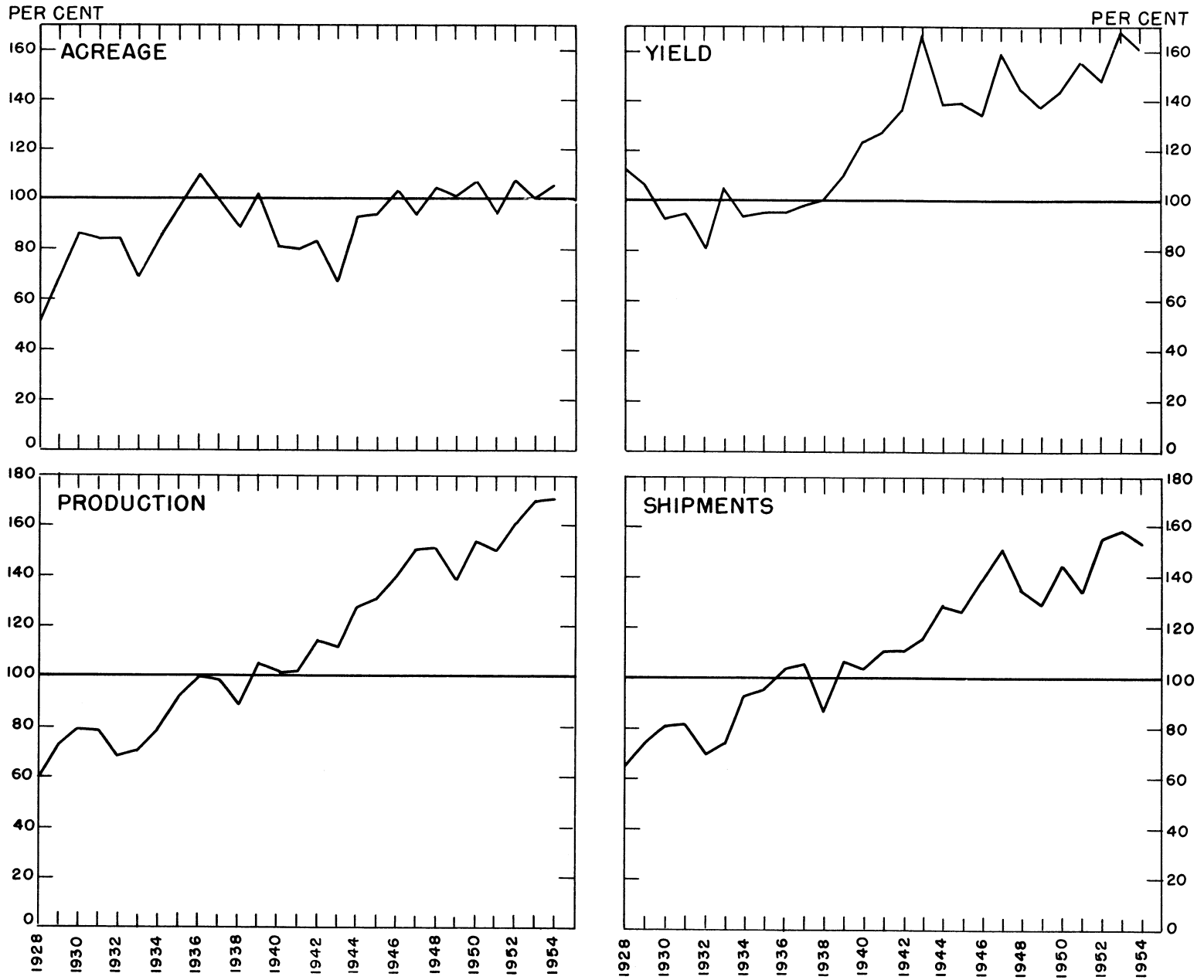

Figure 2.– Salinas-Watsonville-Hollister, index of lettuce acreage, yield, production and shipments. 1928-1954. (1935-39 = 100)

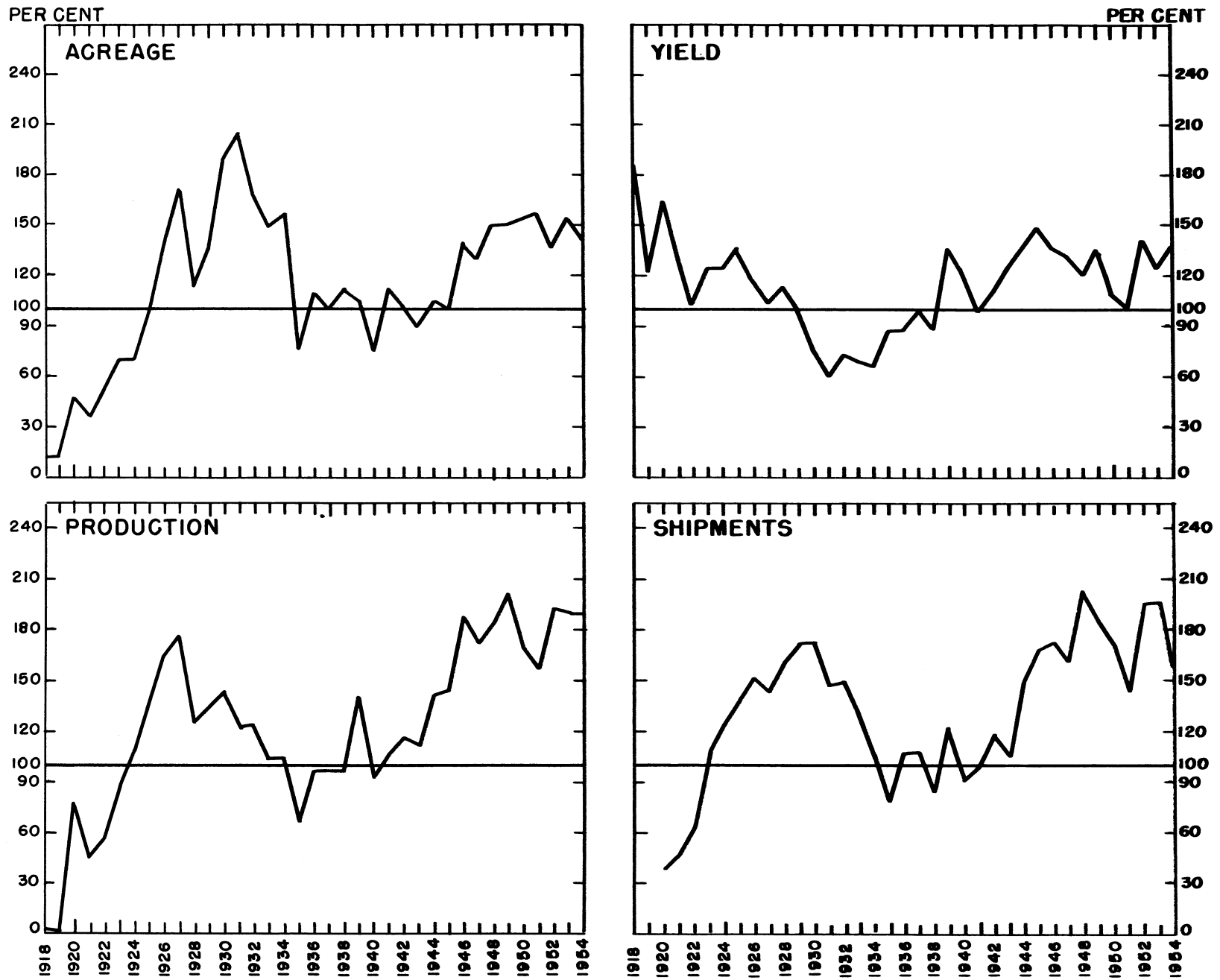

Figure 3.- Imperial Valley, index of lettuce acreage, yield, production and shipments. 1918-1954. (1935-39=100)

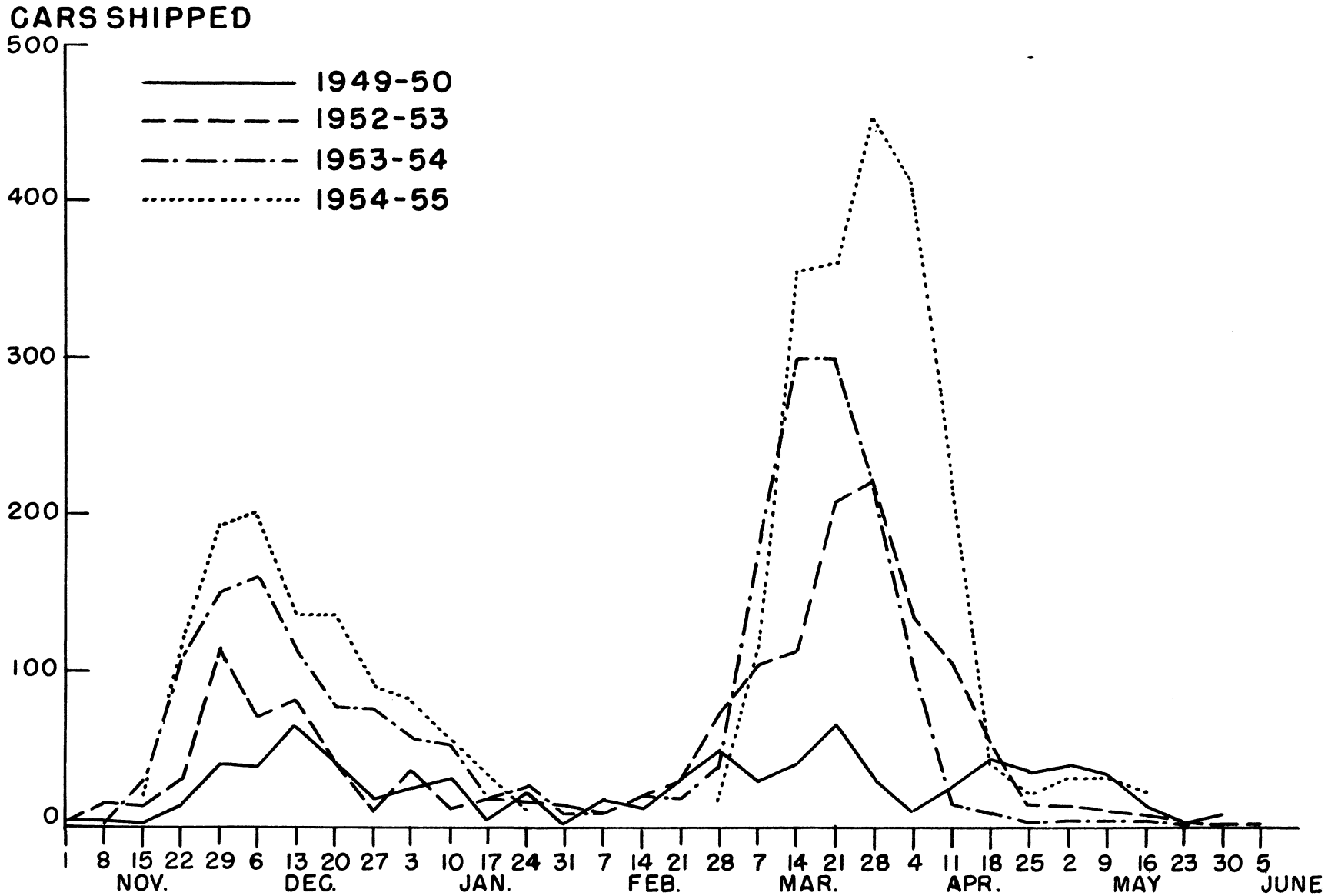

Figure 4.- Weekly carlot shipments of lettuce from the Southern California district, 1949-50, 1952-53, 1953-54 and 1954-55.

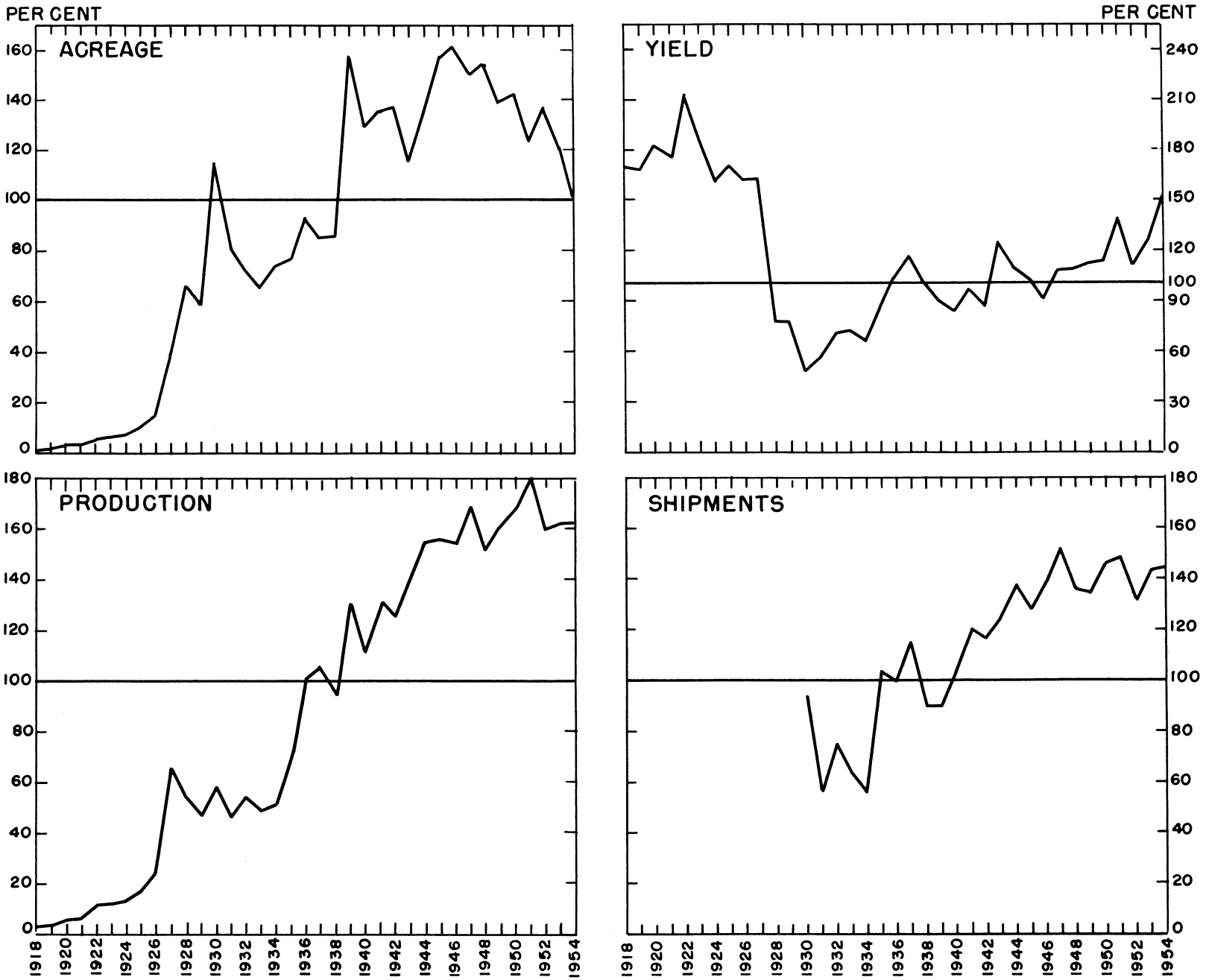

Figure 5. - Salt River Valley, index of lettuce acreage, yield, production and shipments. 1918-1954. (1935-39=100)

Salinas-Watsonville Hollister in total production. Trends for this district are shown in Figure 5. Acreage, production, and shipments all show an upward trend while yields are upward since the late 1920's.

The increases in production and shipments were possible because of acreage increases. Yields have not increased rapidly enough to account for a sizeable share of production and shipments.

Yuma

Figure 6 shows the trends for acreage, yield, production and shipments for this Arizona district. Acreage probably grew at a more rapid rate in Yuma during the 1920's than in any other district. However, since the late 1920's, acreage has tended to decrease slightly. Shipments and production have fluctuated widely but have a definite upward trend. Yield per acrea, as in most other districts, decreased until the 1930's. Since then it has increased enough to keep production and shipments rather high.

Texas

Due to the nature of the lettuce industry in Texas, individual producing districts are relatively small, yet when combined these districts comprise one of the six major areas. In 1945 Texas for the first time produced enough lettuce to become recognized as an important producer. Figure 7 shows data on acreage, yields, production, and shipments. Yield per acre has remained practically stable, while acreage, production, and shipments are definitely upward.

Other Areas

Because of the relative unimportance of areas other than the western, no breakdown

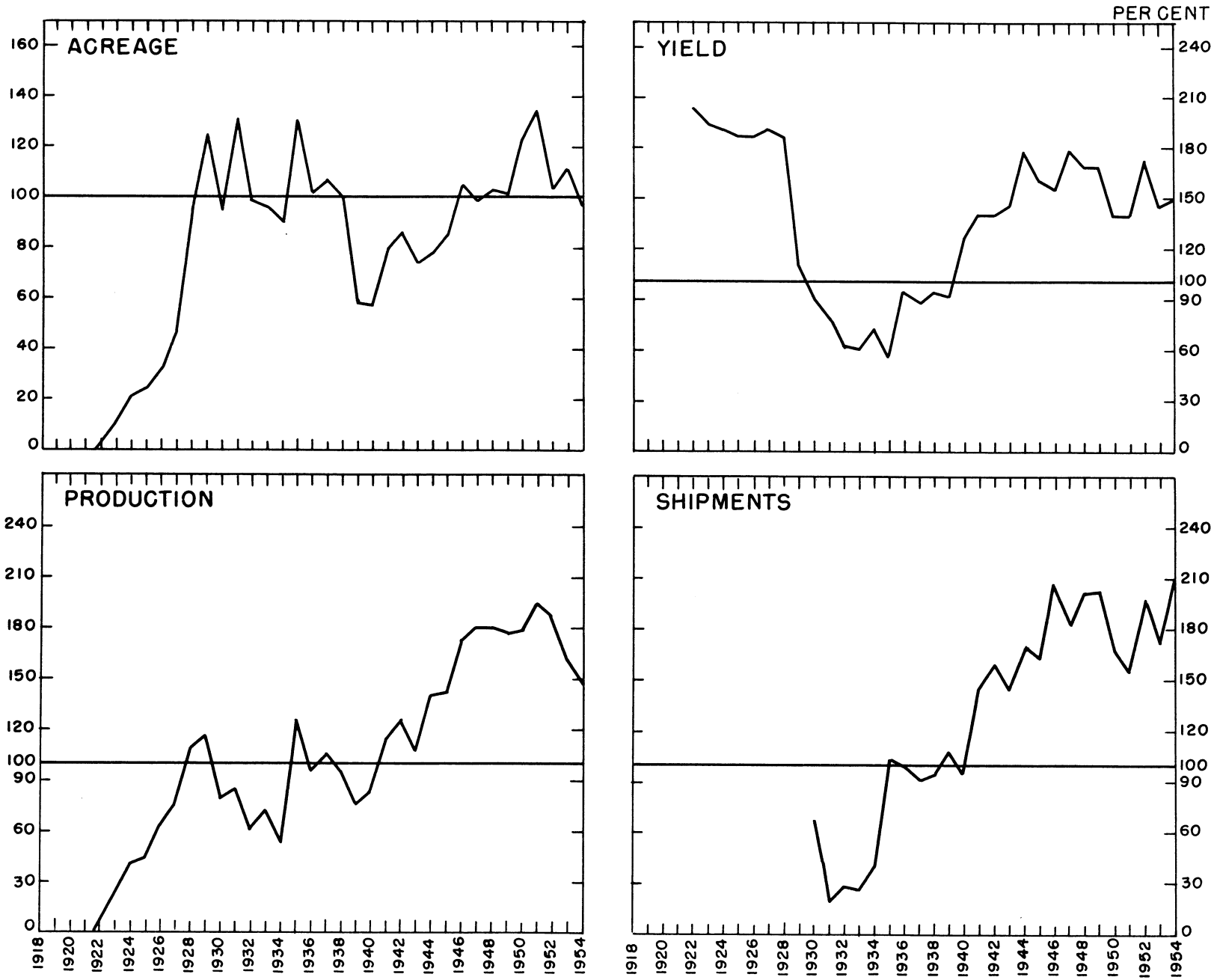

Figure 6 — Yuma valley, index of lettuce acreage, yield, production and shipments. 1918-1954. (1935-39=100)

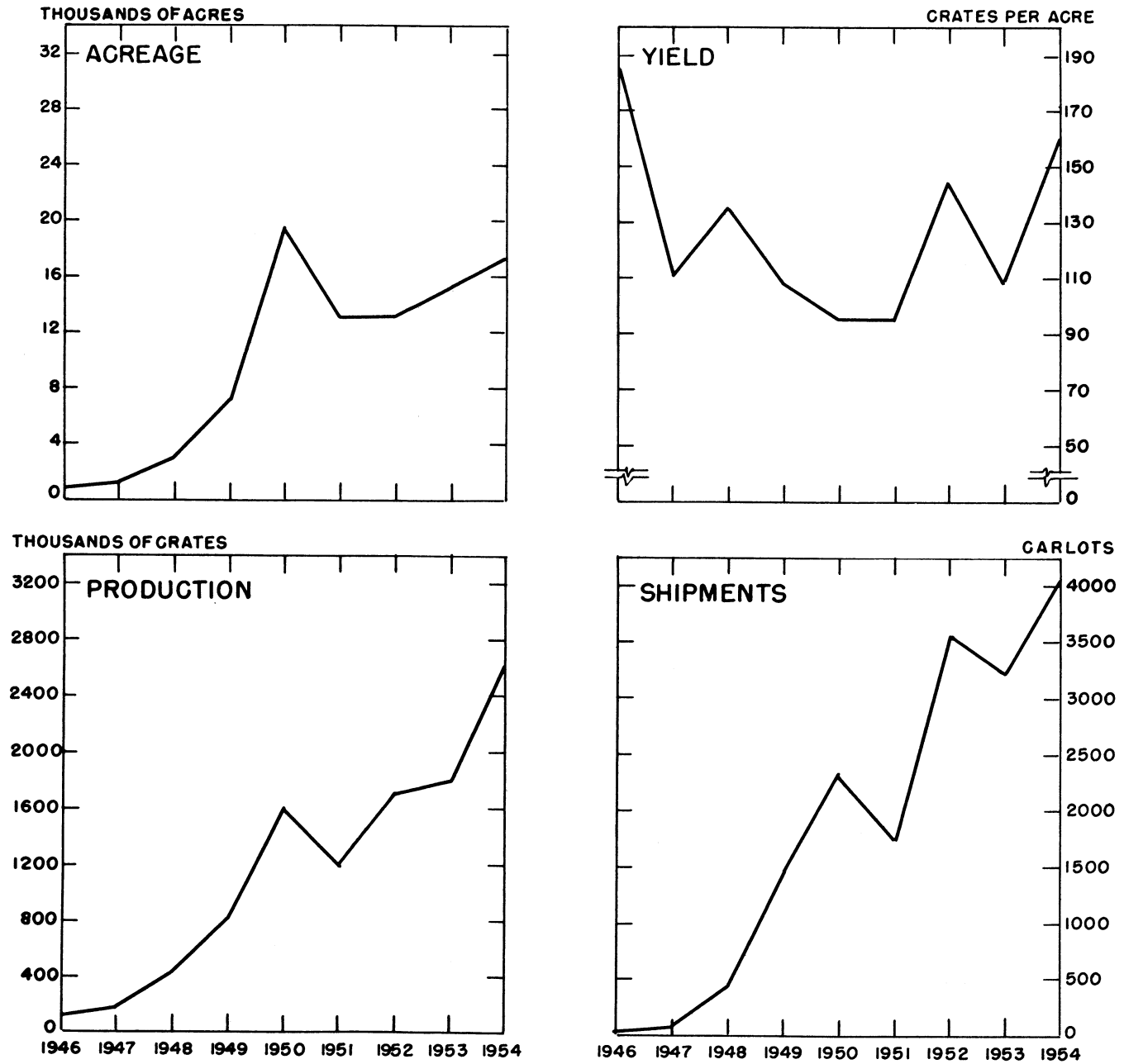

Figure 7.— Texas, acreage, yield, production, and shipments. 1946-1954.

by districts will be attempted. Rather, the discussion will be by geographical regions. Since 1920 the North Atlantic States (Maine, Massachusetts, Connecticut, New Hampshire, Rhode Island, New York, New Jersey, and Pennsylvania) have decreased in total farm value of lettuce from 21.6 per cent to 5.9 per cent.

Only two North Central States, Ohio and Michigan, produce enough lettuce to be considered commercially important. However, they were not considered commercial producers until 1952. These states in 1952 accounted for 1.02 per cent of the total farm value of lettuce. By 1955 this had decreased to 0.88 per cent.

The South Atlantic States (Delaware, Maryland, Virginia, North and South Carolina, Georgia, and Florida) have also lost a large share of the farm value lettuce, decreasing from 19.6 per cent in 1920 to 1.9 per cent in 1955.

The South Central States (Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Oklahoma, Arkansas, and Texas) have only one state, Texas, producing lettuce on a commercial basis. This region, beginning in 1920 with 2.8 per cent of the total farm value of lettuce, had ceased to produce sufficient volumes for reporting by 1935. However, by 1955 this region had increased its share of the total farm value of lettuce to 5.8 per cent.

Seasonality of Production in the Western Lettuce Industry

Lettuce data are usually reported by seasonal groups and are classified as follows:

1. Winter--Acreage planted after September 1, and for harvest during the period December 15 to March 15.
2. Spring--Acreage planted before March 1 for harvest until July 1.
   a. Early Spring--planted in January for harvest to May 1.
   b. Late Spring--planted February for harvest to July 1.

3. Summer--Acreage planted during the period March 1 to June 1 for harvest during period July 1 to September 1.

4. Fall--Acreage planted June 1 to September 1 for harvest during period September to December 15.

   a. Early Fall--planted during period June 1 to July 15 for harvest September 1 to November 1.

   b. Late Fall--planted during period July 15 to September 1, for harvest November 1 to December 15.

Some overlapping occurs between crop seasons and between seasonal groups. This is especially true where the lettuce harvest extends over a long period.

Seasonality of Production

The distribution of western lettuce production by state and season are shown in Figure 8. Late fall and winter seasons show the largest production of any seasons. This is largely because five districts produce during these seasons. These are: Salt River Valley (fall), Yuma, Texas, Imperial Valley, and Blythe.

Seasonality of Shipments

March, April, and May have, in recent years, been the peak period for carlot shipments (Table 1). During March the Salt River Valley (spring), Yuma, Imperial Valley, Blythe, and Texas are shipping and all of them except the Imperial Valley are nearing the seasonal peak of shipments. Figure 9 shows the total monthly lettuce shipments for the years 1940, 1947, and 1954.

For April and May, Salinas-Watsonville-Hollister replaces Yuma, so five districts are shipping during these months. June, July, and August are months of low shipments, when

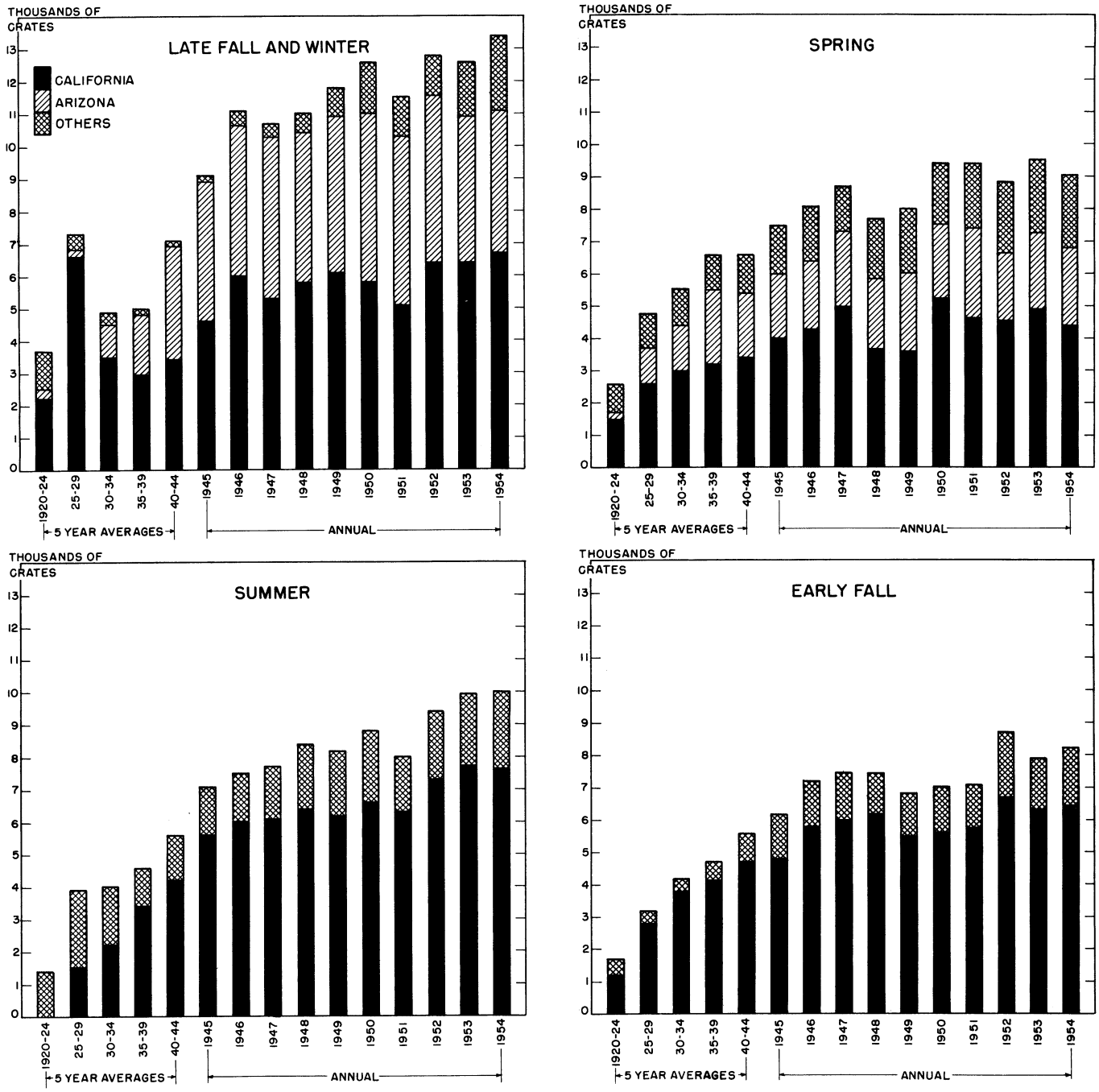

Figure 8.— Lettuce production by seasonal group and state. California, Arizona, and others. 5-year average 1920-24 to 1940-44. Annual 1945 to 1954.

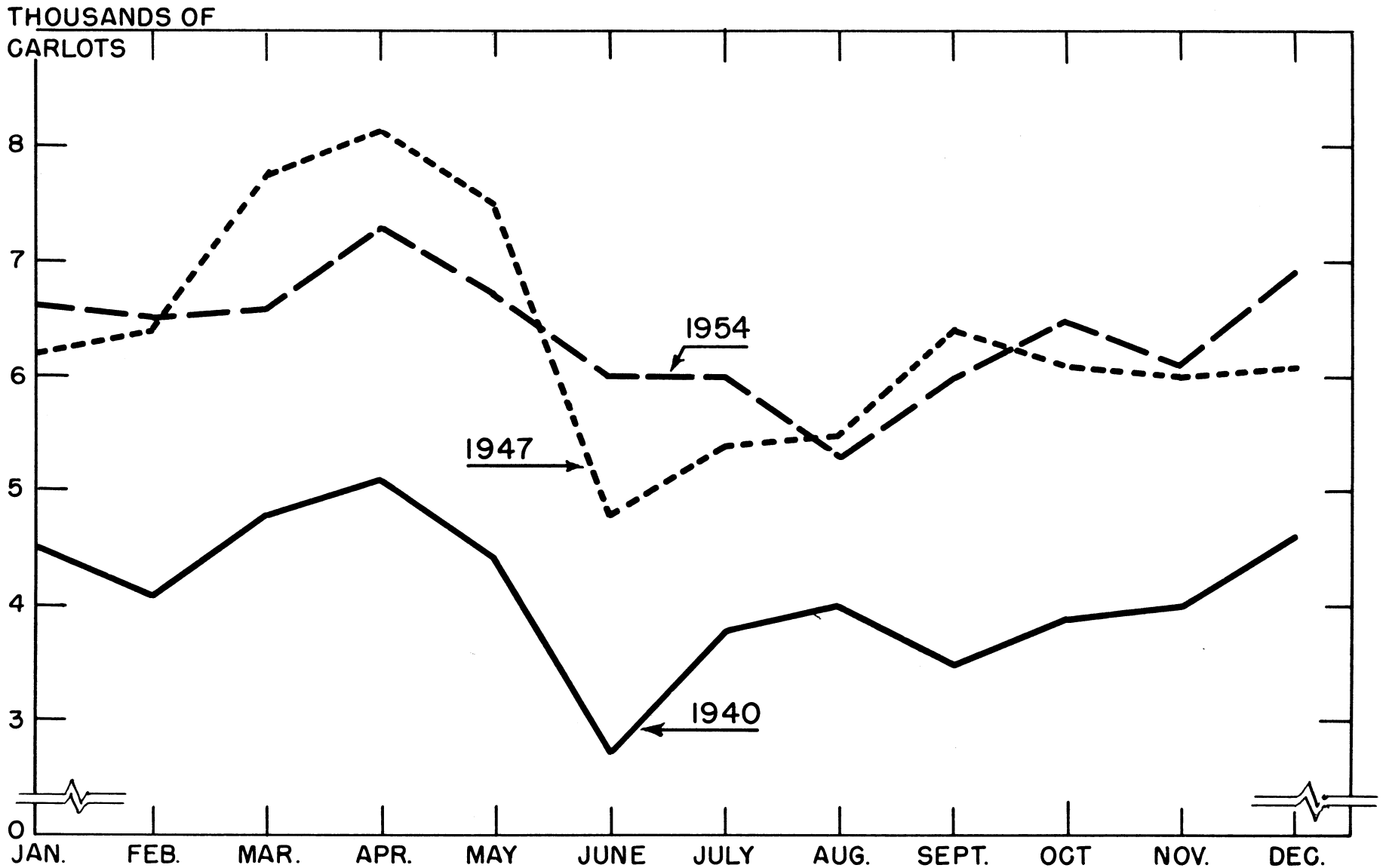

Figure 9.- Lettuce carlot shipments by month for 1940, 1947 and 1954.

Table 1. Lettuce, Carlot Shipments by Month for the United States, 1940-1954.

Year	January	February	March	April	May	June	July	August	September	October	November	December
1940	4,562	4,129	4,892	5,123	4,476	2,740	3,811	4,005	3,510	3,919	4,037	4,682
1941	4,766	5,244	5,637	5,651	4,957	3,248	4,363	4,215	4,314	4,548	4,017	4,666
1942	5,590	4,223	6,217	6,802	5,027	2,736	4,109	3,979	3,977	4,510	3,868	5,192
1943	4,638	5,077	5,887	4,993	5,883	3,198	4,373	3,098	4,360	4,566	5,067	5,969
1944	5,692	6,351	7,254	5,934	8,119	3,973	5,428	3,953	4,987	5,620	4,484	5,190
1945	7,945	5,576	5,302	7,686	6,218	4,667	4,649	5,160	4,626	5,627	3,989	6,963
1946	6,487	4,885	8,019	9,451	6,151	4,553	5,775	5,352	5,558	6,079	5,908	6,505
1947	6,216	6,464	7,777	8,177	7,566	4,874	5,453	5,502	6,417	6,297	6,082	6,116
1948	6,642	6,220	7,390	7,924	5,995	4,802	5,707	5,311	5,551	5,833	6,015	6,727
1949	5,750	5,489	6,762	8,344	7,754	5,023	5,872	4,266	4,770	5,157	5,782	5,999
1950	5,940	6,863	6,935	7,431	8,946	5,134	5,142	5,077	5,412	5,595	6,261	6,511
1951	6,802	5,880	6,190	6,248	8,007	3,311	5,443	5,373	5,147	5,789	4,591	5,342
1952	6,884	6,662	6,915	7,306	8,000	4,786	6,864	5,541	6,328	6,631	5,738	6,595
1953	7,137	6,101	7,481	7,355	7,910	6,274	5,648	6,302	5,971	6,157	6,778	6,358
1954	6,633	6,512	6,655	7,305	6,788	6,090	6,093	5,389	6,080	6,566	6,144	6,999

only one district, Salinas-Watsonville-Hollister is shipping lettuce.

SEASONAL AND INTER-AREA SHIFTS

Within the western lettuce industry three types of shifts have taken place: (1) Shifts within specific producing districts as to planting and harvesting dates, (2) Shifts between the major districts as to the relative amount of lettuce shipped, with respect to seasonal shipments and to total annual shipments, and (3) Shifts to new areas of production.

To show the effect of these shifts on each of the producing districts, two comparable five year periods were selected. These periods are 1937-38 to 1941-42 and 1949-50 to 1953-54, hereafter designated as the first period and the second period.

Salinas-Watsonville-Hollister

Figure 10 shows the average weekly carlot shipments of lettuce from this California district for both time periods. Shipments for the first period were 25,559 carlots compared to 36,866 carlots for the second period, an increase of 44.2 per cent. The average weekly increase in shipments, second period over the first, was 390 cars. The greatest increase in carlot shipments for this district came during May, June, and July. For six weeks of these three months this district showed an average gain of more than 600 cars.

The rapid growth of this district in May and June is probably due to: (1) adverse weather conditions which often delay the April harvest, (2) high demands for lettuce because of warming temperatures, and (3) the absence of sufficient volume of lettuce in other districts to fill the demand. Large gains were also made in September and October.

Decreases in carlot shipments from this district in April and November occurred from the first period to the second period. Carlot shipments for November declined from 3,309 cars in the first period to 1,840 cars in the second period. For December the

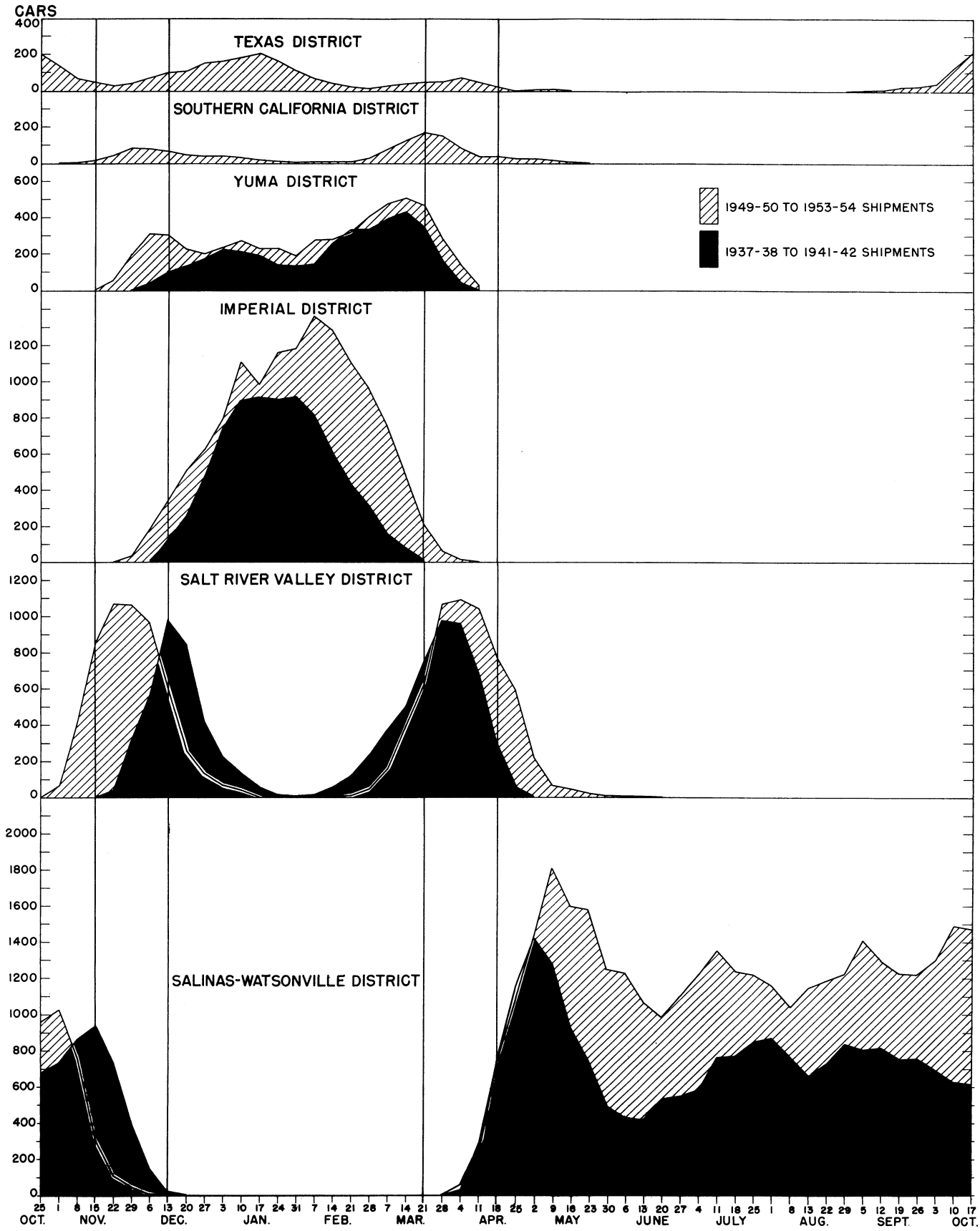

Figure 10:- Average weekly carlot shipments of lettuce, six major districts 1937-38 to 1941-42 and 1949-50 to 1953-54.

decline was from 220 cars in the first period to 17 cars in the second period.

From Figure 10 it is observed that the losses by this district are almost offset by gains in the Salt River Valley, Yuma, and Texas. It is also apparent that the Salinas-Watsonville-Hollister spring shipment peak has shifted from the last week in April during the first period to the first week in May for the second period. Offsetting this shift has been the shift of the Salt River Valley spring shipment peak from the last week in March for the first period to the first week in April for the second period.

In the fall shipping season three districts are involved in these shifts. They are the Salt River Valley fall, Imperial Valley, and Yuma. The Salt River Valley fall district has been the primary district filling the gap left by the fall shift of Salinas-Watsonville-Hollister. The Salt River Valley district now reaches its fall peak a full month earlier than during the first period. The Salinas-Watsonville-Hollister district now completes shipping activity two weeks earlier than during the first period.

This shift to an earlier ending date during the fall has left room for the Imperial Valley to increase its shipments by beginning two weeks earlier.

Now Yuma also begins shipping two weeks earlier during the fall season. Actually what has happened to the Salinas-Watsonville-Hollister district is that it has become more compact, with a shorter shipping period in the second period than in the first period.

One noticeable characteristic of the Salinas-Watsonville-Hollister district is the large increase (44.2 per cent) in carlot shipments.

Salt River Valley (Fall)

The increase of lettuce shipments in the fall season by this district, from first period to second period, has been the second most sizeable, on a percentage basis, of all those

studied. Increased shipments from this district were from 3,633 cars in the first period to 5,556 cars in the second period, an increase of 52.9 per cent. The average weekly increase in carlot shipments was 170 cars.

The shifts of lettuce shipments in the fall season by the Salt River Valley have been the most sizeable of all those studied. For November, carlot shipments increased from an average of 268 cars during the first period to 3,118 cars in the second period. In December shipments decreased from 2,997 cars in the first period to 2,356 cars in the second period.

As the Salt River Valley (fall) district began supplying the bulk of lettuce shipments in November, the Yuma and Imperial districts moved into December. Texas also began shipping during December and the losses suffered by the Salt River Valley (fall) have been more than offset by these three districts. The Imperial Valley has shifted into December and now has a completely dominant position during the early winter season.

Salt River Valley (Spring)

Average total shipments for the spring season in this district have increased from 4,967 cars, first period, to 6,228 cars, second period, an increase of 25.4 per cent. This was the smallest gain recorded among the major districts. The average weekly increase, second period over first period, was 129 cars.

The shift by this district during the spring season is significant though not as marked as the shift in the fall season. For the first six to seven weeks of this season, carlot shipments decreased from the first period to the second period. However, this decrease was more than offset by the overall growth, and shift into May and June.

There was a decrease in carlot shipments during February and March, but the decrease

in February is not nearly as significant as the decrease in March. In February a small volume of shipments were involved. In March carlot shipments decreased from an average of 2,883, first period, to 2,183, second period. To offset this loss the Salt River (spring) has increased carlot shipments during April by nearly 110 per cent.

The Imperial and Yuma districts offer the Salt River Valley much competition during the early spring season. The Salinas-Watsonville-Hollister district offers competition in the late spring season. So a partial result of the competition, the shift by the Salt River Valley (spring) has been restricted. Whether the shifts of the Salt River Valley (spring) district will continue to manifest themselves depends largely upon the strength of four districts -- Yuma, Imperial, Blythe, and Salinas-Watsonville-Hollister. From Figure 10 it appears that Salinas-Watsonville-Hollister is immovable during this season and the Salt River Valley (spring) is in a squeeze between the four districts. Which ones will shift, if any, only time will tell.

Imperial Valley

This district, along with Yuma and Texas, ships almost 100 per cent of the commercial lettuce crop during January and February. These three districts are completely dominant during the period mid-December to mid-March. However, the Imperial Valley ships approximately 70 per cent of all the commercial shipments during January and February, and in recent years has moved into mid-December.

Average total shipments for this district have increased from 7,768 cars, first period, to 12,120 cars, second period, an increase of 68.9 per cent. The average weekly increase from first period to the second period was 228 cars. This overall growth was possible primarily because of the increased demand for winter lettuce. However, some of

the growth was at the expense of other districts. The major shift in this district has been the movement of the seasonal peak in carlot shipments from early February to mid-February.

Imperial Valley gained an increased share of the late fall-winter lettuce market primarily at the expense of the Salt River Valley (fall). This is also true for one month, March, in the spring season. Yet, all districts have lost ground in relative terms to Texas during the winter season.

Yuma

Average carlot shipments from this district increased from 3,897 cars, first period, to 5,750 cars, second period, an increase of 46.5 per cent. The average weekly increase from the first period to the second period was 60 cars.

One of the most noticeable characteristics of this district has been the growth during November and December. Carlot shipments in November increased from three cars, first period, to 530 cars, second period. For December the increase was even greater - from 178 cars to 1,221 cars.

While this district made gains in November and December, it was losing some of the market in January and February. The gains and shifts by Yuma were partially responsible for losses incurred by the Salinas-Watsonville-Hollister district during the same month. Gains by Yuma in December were made at the expense of the Salt River Valley (fall).

It is apparent that Yuma suffers from keen competition during all important weeks of the shipping season. This is the result of increased pressure from the two new major districts, Texas and Blythe, added to pressure from the Salt River Valley and Imperial Valley. Yuma in all probability will continue to shift. However, the direction and magnitude are not clear at this time.

Texas

Texas had no shipments of consequence during the first period. The shipments for the second period are shown in Figure 9.

During October, December, and January, Texas moves approximately three-fourths of its total shipments into the market. The Hereford area begins shipping in September but reaches a peak in mid-October. The Uvalde and Lower Rio Grande Valley areas usually begin shipping in mid-December, reaching a peak in January, but frequently extending into mid-February. Texas furnishes more competition to the other districts during January than in any other period. For the second period, Texas averaged 12 per cent of all January carlot shipments. During October, Texas shipped 10 per cent of all carlot shipments, but this apparently has little or no effect on the market for Salinas-Watsonville-Hollister lettuce.

The amount of lettuce that is shipped by truck from Texas has been estimated to be from 50 to 75 per cent. These movements by truck are not recorded into carlot shipment data. Total annual carlot shipments would increase from 3,000 to approximately 6,000 if the truck figures were included.

There are two factors favoring the continued development of this district, (1) Lower production costs, and (2) Shorter distances to large local markets. One factor, weather variation, appears to be a serious handicap. This is especially true in the Hereford and Uvalde areas.

Blythe

No lettuce of importance was shipped from Blythe during the first period. The second period carlot lettuce shipments are shown in Figure 4. Readily noted are the two peaks,

one in late November-early December, and one in March. These shipment peaks correspond closely to the shipment peaks of the Salt River Valley (fall). Despite the peaks of shipments corresponding closely during these months, competition from Blythe is more keenly felt during March.

The districts most seriously affected by the Blythe growth are Yuma and the Salt River Valley, although Salinas-Watsonville-Hollister is slightly affected. Blythe appears to be pushing the Salt River Valley (spring) season toward a later date. This apparently will cause the Salt River Valley (spring) to be under more pressure from the Salinas-Watsonville-Hollister district.

MARKETING FUNCTIONS

Harvesting and Packaging

The method of harvesting lettuce most widely used is the field harvesting and packing for vacuum cooling. Approximately 90 per cent of the western lettuce crop is packed for vacuum cooling.

Field Harvesting and Packing

In harvesting lettuce for vacuum cooling the ground-pack method of field packaging is used. Cutters using small bolo knives cut the heads and place them in the row. Packers follow, placing the heads in the cartons which were previously distributed along each row. After being filled the carton is closed by a stitcher, loaded and trucked to a cooling shed.

Machine Harvest

This type of harvest sometimes referred to as the trailer-pack method, is a variation of the ground-pack method. The difference from the ground-pack method is that after the

heads have been cut by hand and placed on an outrigger of the machine, the packing activity is completed on the machine. After packing, the filled carton is placed on a conveyor which moves it to an awaiting truck. It is important to note the absence of trimmers in the new harvesting-packaging methods.

Cooling

Before shipment to market, one of two cooling methods is used -- vacuum cooling or ice cooling.

Vacuum Cooling

The lettuce arrives directly from the field on trucks loaded with 320 cartons. The 320 cartons are unloaded in one operation, placed on dollies and rolled into the vacuum tube. Huge pumps pull the air from the tube, creating a vacuum. Moisture is removed from the lettuce, and as this is done the lettuce is cooled by evaporation. When the temperature of the lettuce has reached 33° F. all operations cease, and the temperature is held constant for a few minutes. The time required to complete the cooling of 320 cartons is approximately 20 minutes.

Another vacuum cooling procedure involves plants which can cool the lettuce after it has been loaded into the rail car. The car is loaded with 640 cartons, rolled into a huge vacuum tube and cooled by the evaporation of moisture from the lettuce.

Table 2 shows the shift from the old ice-cooling method to vacuum cooling. Reasons for this shift have been: (1) Less damage to both container and lettuce, and (2) Lower cost. Table 3 shows the comparative cost of the old and new methods in the Imperial Valley in 1952.

Table 2. Lettuce, Carlot Shipments by Container from the Four Major Districts by Season, 1951-1954.

District	Season	Total carlot shipments	Crates		Cartons	Per cent cartons are of total
			Ice-pack	Dry-pack		
Salt River Valley	Fall 1952	5,783	--	--	--	a/
	Spring 1953	6,079	--	--	--	50 b/
	Fall 1953	5,864	906 c/	c/	4,958	85
	Spring 1954	6,457	345	255	5,857	91
Yuma	1952-1953	7,550	6,607	76 d/	867	12
	1953-1954	10,487	2,723 c/	c/	7,764	14
Imperial Valley	1951-1952	14,530	--	--	--	a/
	1952-1953	13,937	--	--	--	40 e/
	1953-1954	13,684	2,261	329	11,094	81
Salinas-Watsonville-Hollister	1952	38,402	--	--	--	20
	1953	39,283	--	--	--	39
	1954	37,962	--	--	--	75 f/

a/ Increases in volume of cartons
b/ Estimate made by Federal-State Market News Service
c/ Breakdown of crates unavailable
d/ Dry pack crates, but vacuum cooled
e/ Breakdown of shipments unavailable
f/ May include some crates, but vacuum cooled

CONTAINERS

In recent years the lettuce industry has undergone a major change in shipping containers. Factors responsible for the success of the new containers have been (1) Adaptability to vacuum cooling and (2) Favorable reception by wholesalers and retailers

Table 3. Comparative Cost of Harvesting, Packing, and Cooling of Lettuce in Imperial Valley and Arizona, 1952.

	Method	
	Shed-packed, Ice in wooden crates.	Field Dry-packed in paperboard cartons.
	(dollars per crate)	(dollars per two crates)
Harvesting	.37	---
Harvesting and packing	---	.79
Packing and shed operation	1.60	---
Vacuum cooling, material & supplies	.18	.82
Administrative and selling	---	.22
Total	2.15	1.83

Source: "Packing and Shipping Lettuce in Fiberboard Cartons and Wooden Crates," Marketing Research Report No. 86, Agricultural Marketing Service, U.S. Department of Agriculture, Washington, D.C.

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Standard Containers

Until recently, western lettuce was packed and shipped in the Western Growers' Association (WGA) crate. The WGA crate replaced the old Los Angeles (LA) crate. Both the WGA and LA crates were of wood and nail construction. The new containers are fiberboard cartons.

In 1954, Arizona passed a standardization bill limiting the number of types of containers to be used in shipment of lettuce and designated nine containers as standard. California, in a similar law, limited standard containers to 10.

In 1956, Arizona and California passed laws which further limited standard containers to two, shich are now standard in both states. One is of wood and nail construction with dimensions of 14 1/4" x 18 1/4" x 20 1/2" and will be used for shipment of dry-packs to the large markets on the west coast. The other container is fiberboard construction with dimensions of 9 3/4" x 14" x 21", and will be used for shipment to the eastern markets.

The law in Arizona prohibits the use after March 15, 1957 of any container not designated as standard. The California law permits use of non-standard containers until April 15, 1957. The limiting of containers to two types for both states undoubtedly is welcome to shippers, buyers, and container manufacturers.

Container Cost

Table 4 shows the cost of harvesting, packing, and cooling lettuce by type of container. It is apparent that the use of cartons results in savings, regardless of cooling method.

Table 4. Cost of Harvesting, Packing, Cooling, and Loading Lettuce by Type of Container, Imperial, Salt River Valley, and Salinas-Watsonville-Hollister, 1952. a/

Type of container and method of packing and cooling.	Per Container		Per four & five dozen heads	
	Imperial Valley and Arizona	Salinas-Watsonville-Hollister	Imperial Valley and Arizona	Salinas-Watsonville-Hollister
	(dollars)	(dollars)	(dollars)	(dollars)
Crate WGA				
Shed packed with ice	2.15	2.20	2.15	2.20
Field dry-pack vacuum cooled	1.94	1.76	1.94	1.76
Carton, Dry-packed				
Field, vacuum cooled	.91	.85	1.83	1.70
Fan cooled	.80	---	1.60	---
Shed, vacuum cooled	1.00	1.02	2.00	2.04
Fan cooled	.87	---	1.74	---

a/ "Packing and Shipping Lettuce in Fiberboard Cartons and Wooden Crates," Marketing Research Report No. 86, Agricultural Marketing Service, U.S. Department of Agriculture, Washington, D.C.

Breakage and Damage

There is less damage to container and lettuce when shipped in cartons or WGA crates used as dry-packs. This is due primarily to the method used in cooling and not the container. When dry-packed there is no ice to melt and weaken the container.

Another saving resulting from the use of cartons is that now the outermost wrapper leaves of each lettuce head are not removed and thus protect and cushion each head. The results of a study on loss by serious damage in transportation is shown in Table 5.

Table 5. Loss by Serious Damaged Heads of Lettuce Found in Transportation Test, May and June, 1953. a/ (Western Lettuce Area)

Type of container	Loss at Time of Inspection					
	On Arrival		After 24 Hours		After 48 Hours	
	per cent	dollars	per cent	dollars	per cent	dollars
Cartons	1.60	.10	5.45	.39	17.15	1.20
Crates	4.97	.35	8.49	.60	32.05	2.24

a/ "Packing and Shipping Lettuce in Fiberboard Cartons and Wooden Crates," Marketing Research Report No. 86, Agricultural Marketing Service, U.S. Department of Agriculture, Washington, D.C.

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TRANSPORTATION

Rail and truck facilities are the chief means of transportation employed by lettuce shippers. The selection of transportation method depends largely upon the distance of haul.

Methods

Facilities provided by the railroads are more adequate for the long hauls to the eastern markets than those offered by the trucking industry. However, despite this favorable factor, the railroads are losing the advantage they once held. Table 6 shows total United States lettuce shipments for the period 1941-1954 by rail and truck. Factors responsible for the increasing use of truck are: (1) increased number of trucks and quality of their refrigeration, (2) faster and more dependable vehicles, (3) better highways, and (4) high freight and icing rates charged by the railroads.

Table 6. Truck and Rail Shipments of Lettuce in the United States with Percentage comparisons, 1941-1954.

Year	Truck a/ Shipments	Rail Shipments	Truck and Rail Shipments	Truck as per cent of total	Rail as per cent of total
	carlot equiv.	carlots	carlots	per cent	per cent
1941	7,373	55,626	62,999	11.70	88.30
1942	7,228	56,227	63,455	11.39	88.61
1943	7,239	58,109	65,348	11.08	88.92
1944	8,030	66,985	75,015	10.70	89.30
1945	9,989	68,471	78,460	12.73	87.27
1946	11,721	74,703	86,424	13.56	86.44
1947	11,450	76,941	88,391	12.95	87.05
1948	11,649	74,119	85,768	13.58	86.42
1949	11,810	70,968	82,778	14.27	85.73
1950	13,528	75,247	88,775	15.24	84.76
1951	22,846	68,123	90,969	25.11	74.89
1952	24,827	78,251	103,078	24.09	75.91
1953	27,186	79,474	106,670	25.50	74.50
1954	29,437	77,278	106,715	27.58	72.42

a/ Based on prewar carlot equivalents.

Freight Rates

Rates charged by the railroads for 100 pounds of lettuce, using the most widely used method of icing and refrigeration and shipping to some of the major markets, are shown in Table 7. Table 8 shows the rate charged per carton (carton equals roughly 35 pounds) to the major markets under two schedules of refrigeration.

Markets and Geographical Distribution of Shipments

Figure 11 shows the three largest lettuce markets in the United States; New York, Chicago, and Philadelphia, also other cities which are large markets.

New York is the largest market for western lettuce, receiving 6,200 carlots in 1954. However, this is a decline in shipments from 1947 when New York received 7,400. Apparently this decrease has been brought about by increased truck farm production of lettuce in areas near the center of consumption. This lettuce is shipped by truck into the city in various sized lots, and these movements are not recorded by reporting agencies.

Chicago has followed the same general pattern as New York, decreasing from 6,500 cars in 1948 to 5,200 in 1954. The remaining cities in Figure 11 have had slight but steady increases in total lettuce unloads since 1945.

Combined, the nine United States and five Canadian cities in Figure 11 accounted for 30,000 carlots in 1954. This is nearly 40 per cent of the total carlot unloads of lettuce. California and Arizona accounted for 96 per cent of the 30,000 cars received by the cities in Figure 11.

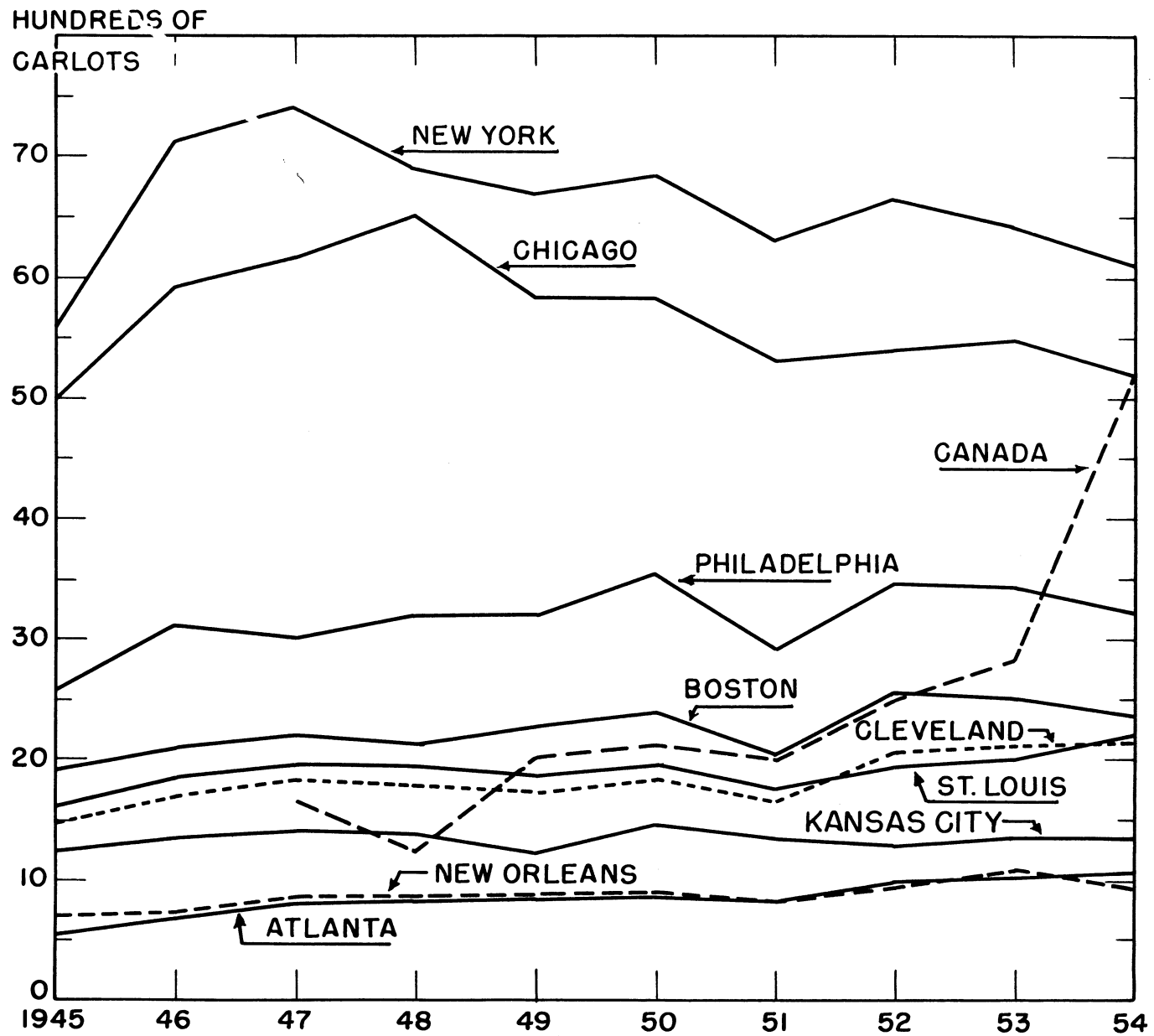

Figure 11.– Carlot shipments of lettuce to 9 U.S cities and 5 Canadian cities 1945-54.

Table 7. Rail Freight Rates, Per Hundredweight, Per Carton, From Imperial, Yuma, Salt River Valley, and Blythe, 1954. a/

Destination	Basic Rate per cwt.	Standard b/ Refrigeration per crate	Standard Refrigeration & 15,000 lbs. top ice per crate	Initial ice & 15,000 lbs. top ice per crate	One reicing in transit per crate	Two reicings in transit per crate	Two reicings in transit & 15,000 lbs. top ice per crate
	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)	(dollars)
Atlanta, Ga.	2.22	2.04	2.12	1.98	1.94	1.99	2.07
Baltimore, Md.	2.28	2.09	2.17	2.03	1.99	2.04	2.12
Chicago, Ill.	1.87	1.72	1.79	1.68	1.66	1.70	1.77
Dallas, Texas	1.69	1.55	1.62	1.53	1.58	1.54	1.61
Denver, Colo.	1.54	1.40	1.47	1.40	1.45	1.40	1.46
New York, N.Y.	2.28	2.09	2.17	2.03	1.99	2.04	2.12
St. Louis, Mo.	1.87	1.72	1.79	1.68	1.66	1.70	1.77
Seattle, Wash. c/ (1)	1.59	1.47	1.54	1.45	1.50	1.46	1.52
(2)	1.64	1.51	1.58	1.49	1.54	1.50	1.56

a/ Table based on minimum weight of 20,000 lbs., 322 crates per car, load weight of 25,896 lbs.
b/ Does not include three per cent Federal tax.
c/ (1) Rate from Imperial, Yuma, and Blythe.
(2) Rate from Salt River Valley.

Source: Wabash Railroad

Table 8. Rail Freight Rate Per Carton, From Imperial, Yuma, Salt River Valley, and Blythe, 1954.

Destination	Full Standard Refrigeration	Half-stage Standard Refrigeration
	(dollars)	(dollars)
Atlanta, Georgia	1.03	.99
Baltimore, Maryland	1.05	1.01
Chicago, Illinois	.87	.84
Dallas, Texas	.78	.76
Denver, Colorado	.71	.68
New York, New York	1.05	1.01
St. Louis, Missouri	.87	.84
Seattle, Washington a/ (1)	.74	.72
(2)	.76	.74

a/ (1) Rate from Imperial, Yuma, and Blythe
(2) Rate from Salt River Valley

Source: Wabash Railroad.

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Geographical Distribution of Lettuce Shipments by Region

Distribution of lettuce carlots is shown in Table 9 by state of origin and region of receipt for the annual average of the years 1947-1951, and annually for 1952 and 1955. Within each region only the largest cities were included, therefore, the percentage figure in Table 9 do not add to 100. Also, total carlot shipment figures include some truck shipments, and the unload figures include no truck shipments. Therefore, if truck shipments were included, the percentage of shipments unaccounted for becomes even less significant.

Table 9. Lettuce Carlot Unloads by Region, and Canada, by State of Origin, and Percentage Unloads of Each Region are of Total United States Shipments, 1947-1951 Average, 1952, 1955 Annual. a/

Unloads by Region	Year and Origin of Shipments													
	Average for Years 1947-1951				1952					1955				
	Ariz. (cars)	Calif. (cars)	Other (cars)	Per cent unloads are of total U.S. shipments	Ariz. (cars)	Calif. (cars)	Texas (cars)	Other (cars)	Per cent unloads are of total U.S. shipments	Ariz. (cars)	Calif. (cars)	Texas (cars)	Other (cars)	Per cent unloads are of total U.S. shipments
Western	423	1,596	--	2.76	179	1,009	6	70	1.62	166	888	--	94	1.50
North Atlantic	5,346	13,665	--	26.01	4,792	14,702	584	199	25.91	5,859	14,892	516	174	27.12
North Central	5,972	17,312	--	31.86	5,647	16,808	782	290	30.07	6,184	17,692	847	255	31.59
South Atlantic	1,304	4,891	--	8.48	1,182	6,010	137	75	9.47	1,499	6,060	235	52	9.92
South Central	1,854	6,813	--	11.86	1,565	6,667	1,346	185	12.48	1,166	6,392	1,119	142	11.15
Canada	617	1,013	--	2.37	830	1,625	21	45	3.23	1,055	1,741	73	44	3.68

a/ Western region includes 12 cities, North Atlantic 18, North Central 33, South Atlantic 15, South Central 22, and Canada 5.

Consumption

The consumption of lettuce per capita, in pounds and heads, together with disposable income, is shown in Table 10. Per capita consumption of lettuce has increased from an average of 7.1 pounds in 1919-1923 to 17.7 pounds in 1954, an increase of 150 per cent. For the same period, per capita income has increased approximately 166 per cent. When measured it was found that as income increases 1.0 per cent lettuce consumption increases .67 per cent.

Table 10. Lettuce Consumption and Disposable Income Per Capita, Five-year Average 1919-1923 to 1944-1948, and Annual 1949 to 1954.

Year	Pounds	Heads a/	Disposable Income
			(dollars)
1919-1923	7.1	4.7	582
1924-1928	10.7	7.1	630
1929-1933	11.9	7.9	504
1934-1938	11.9	7.9	482
1939-1943	13.4	8.9	722
1944-1948	17.1	11.4	1,127
1949	16.3	10.9	1,244
1950	17.2	11.5	1,340
1951	17.1	11.4	1,445
1952	18.2	12.1	1,487
1953	18.0	12.0	1,546
1954	17.7	11.8	1,547

a/ Converted from pounds based on 70-pound crate (four dozen heads)

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RISK

The lettuce industry, as most other agricultural industries, is subject to many risks. However, in few other industries are producers, handlers, and shippers faced with more severe or rapid changes.

Fluctuations in Shipments

Carlot shipments from California for the period 1945-1954 show little relative fluctuation (Figure 12). The spring seasons shows the largest fluctuations from the mean with an average fluctuation of 9.9 per cent. The next largest fluctuation was the summer season with an average fluctuation of 9.3 per cent. The winter season has a lesser amount of variation with an average dispersion of 8.6 per cent. The smallest amount of fluctuation was for the fall season with an average dispersion of 8.6 per cent.

Fluctuation in carlot shipments from Arizona are shown in Figure 13. The largest average dispersion from the mean was in the fall season with 9.6 per cent. Average fluctuation for the winter and spring seasons was found to be the same with an average dispersion of the mean of 8.7 per cent.

Fluctuations in Price

Price fluctuations for Arizona and California lettuce during the period 1945-1954 are considerably higher than were shipment fluctuations. California price for each season during the ten years 1945-1954 is shown in Figure 14.

The California spring season price per crate has fluctuated from a high of $4.30 in 1954 to a low of $2.45 in 1946 and 1949. The spring season had the highest average dispersion from the mean with 20.3 per cent. The fall price had an average dispersion of 18.8 per cent, the winter season 18.5 per cent, and the summer season with 15.7 per cent.

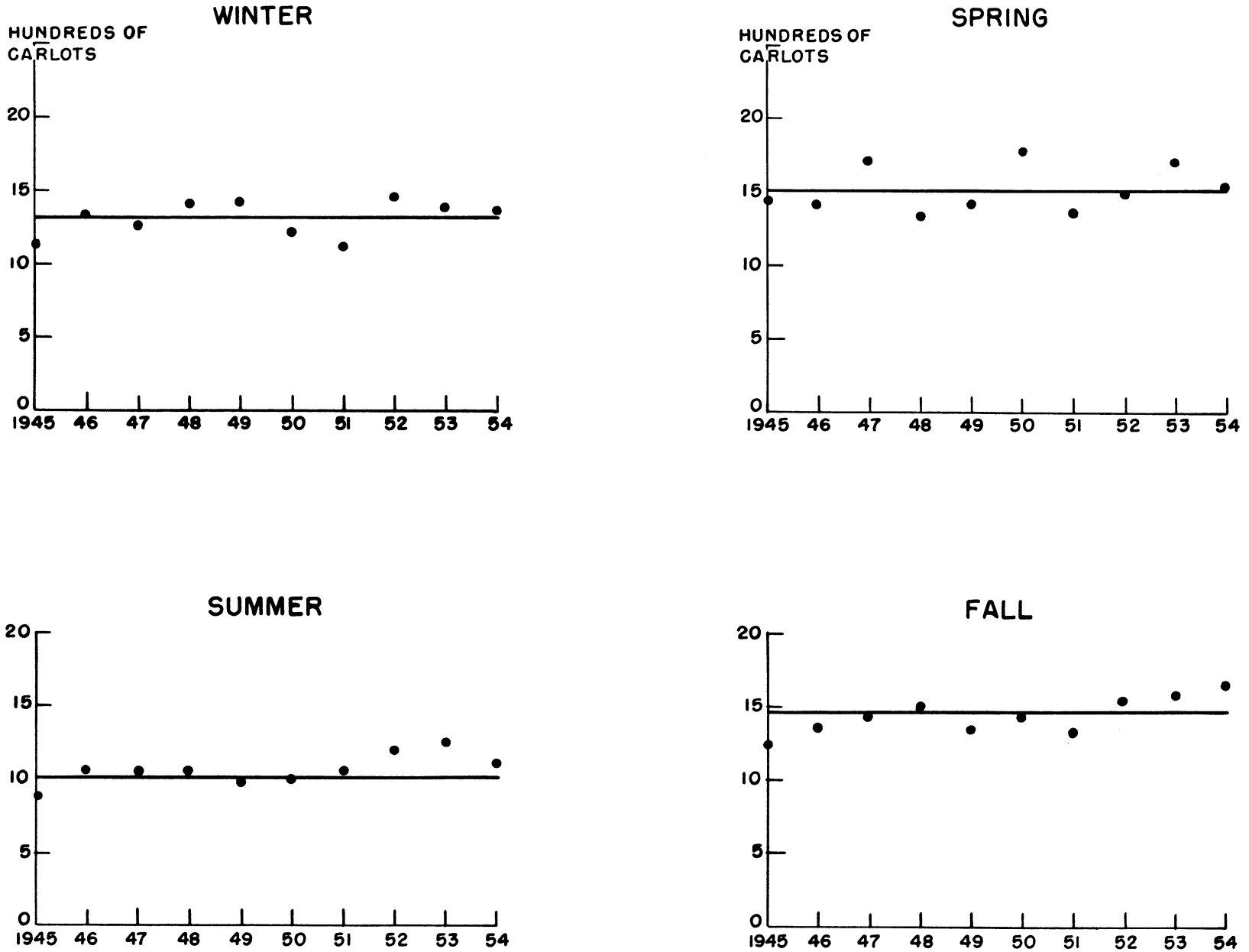
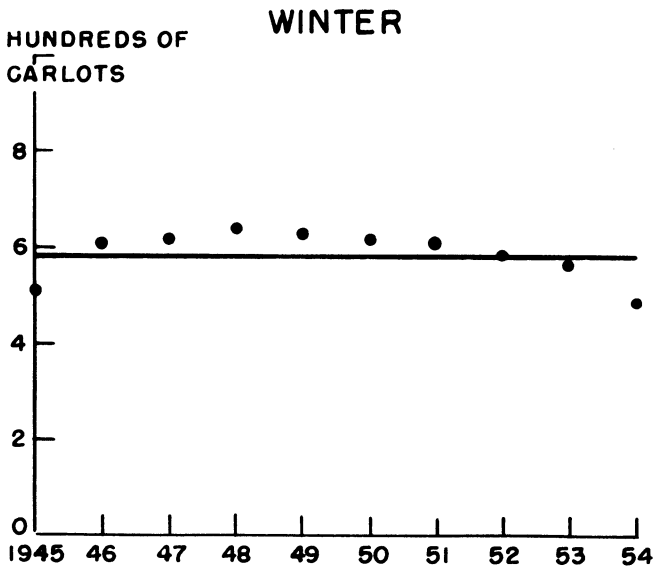
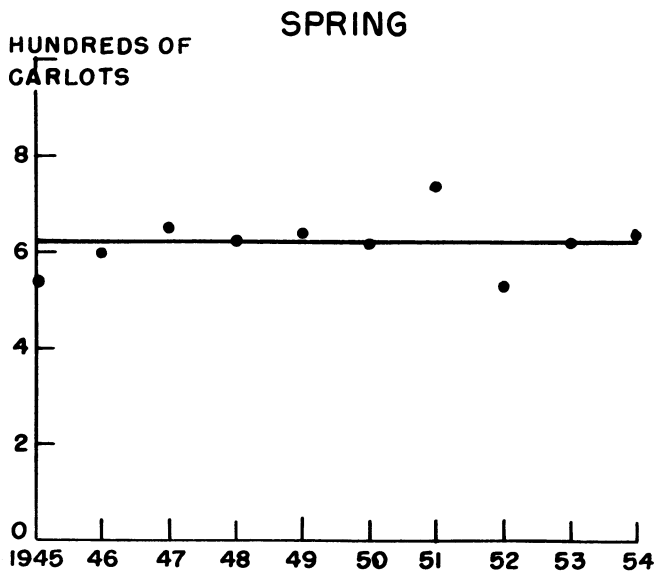


Figure 12. - Variations of California lettuce shipments, from average of years 1945-54. By seasons 1945-54.





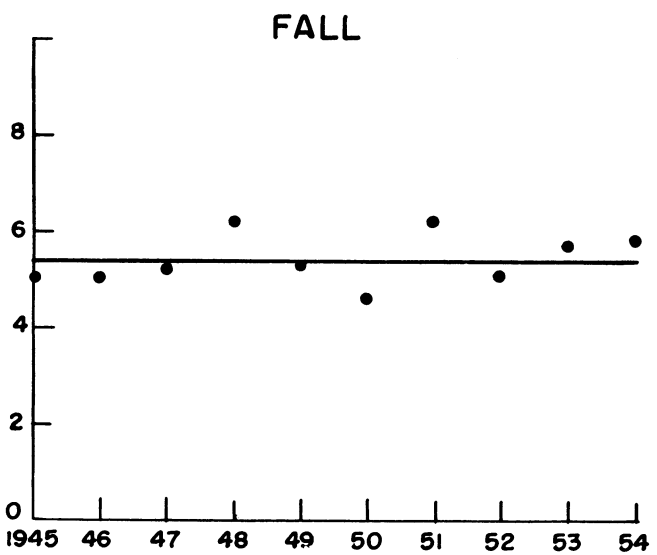


Figure 13. – Variations of Arizona lettuce shipments from average of years 1945-54. By seasons 1945-54.

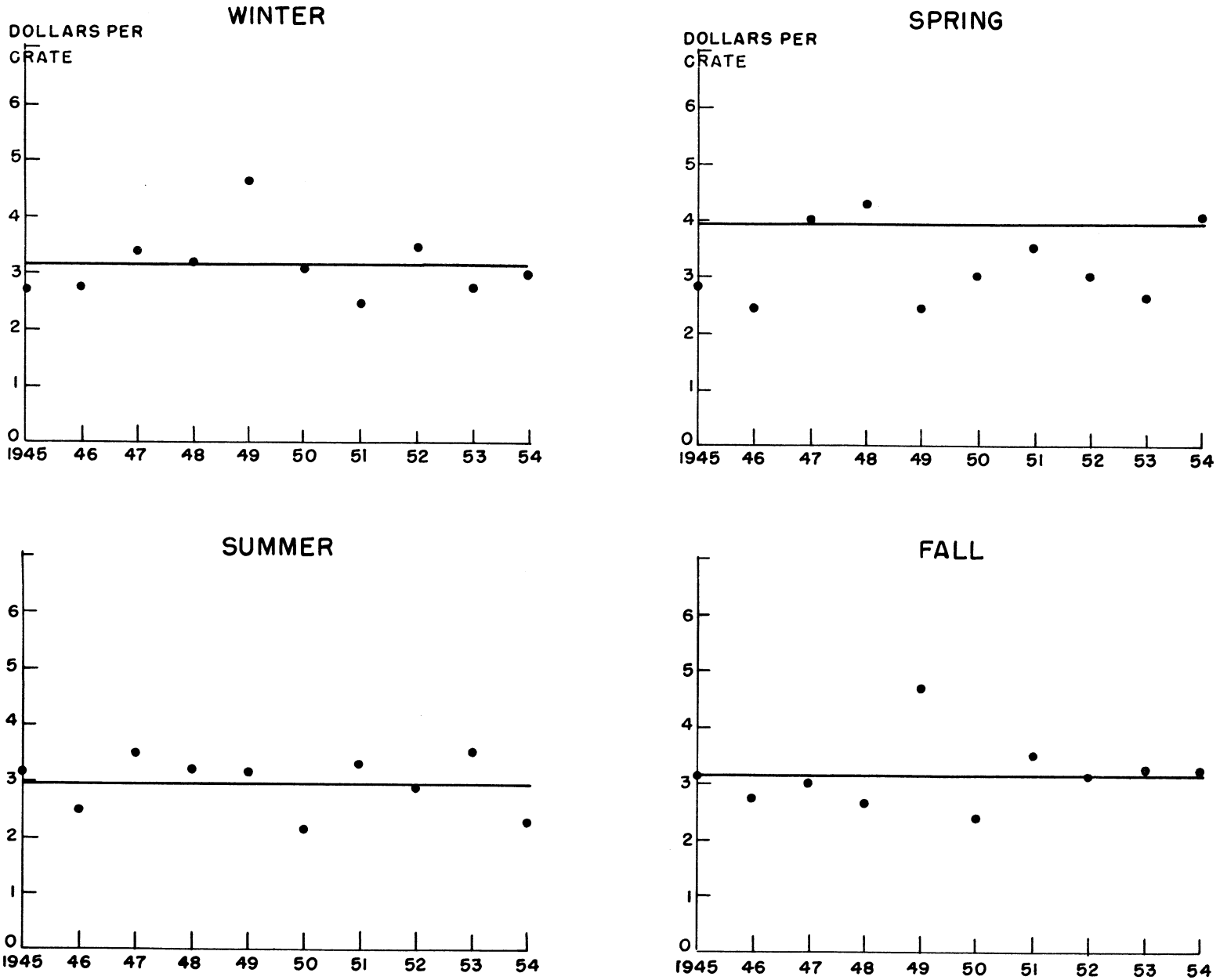


Figure 14. – Variations of California lettuce, price per crate from average of years 1945-54. By seasons 1945-54.

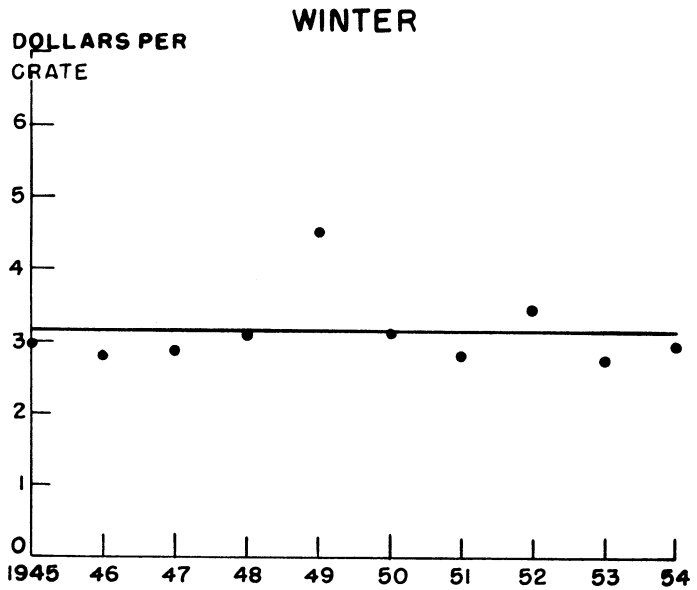
The price fluctuations for Arizona are similar in magnitude to those of California (Figure 15). The fall season illustrates the wide fluctuation that may occur from season to season. In 1950 the price per crate was $3.05. In 1951 the price went up to $6.15, an increase of $3.10 per crate. For the 10 year period, 1945-1954, the fall season had an average dispersion of 26.0 per cent, the winter season 16.1 per cent, and the spring season 15.4 per cent.

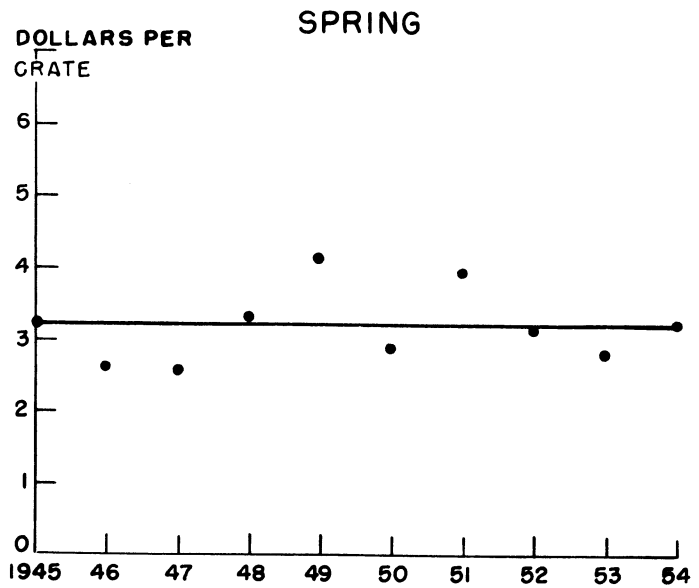
PRICES

No one factor influences the production of a commodity so much as does price. If price is high during a season, production for the following season is usually up, and if price is low then in the following season production is usually down. There are exceptions to these influences. For example, if in the long run both price and production is up and consumption is high enough to absorb the increased production, then price will very likely remain up. If this situation exists in an industry then new producers may be attracted and existing producers expand their operations. In general this has been the case for the lettuce industry and helps explain the long-time growth and expansion.

Trend in Prices by Season

The average yearly price per crate for the 25 years 1930-1954 by seasonal grouping is shown in Figure 15. Quite apparent is the fact that the trend for all seasonal groups is upward. However, there are two distinct periods of rise. The first period, 1930-1940, shows a general stability of price per crate. However, there are wide fluctuations between years. The second period 1943-1954 shows the same general stability, but with extreme fluctuation between years and variations between seasonal groups. Since 1930 the





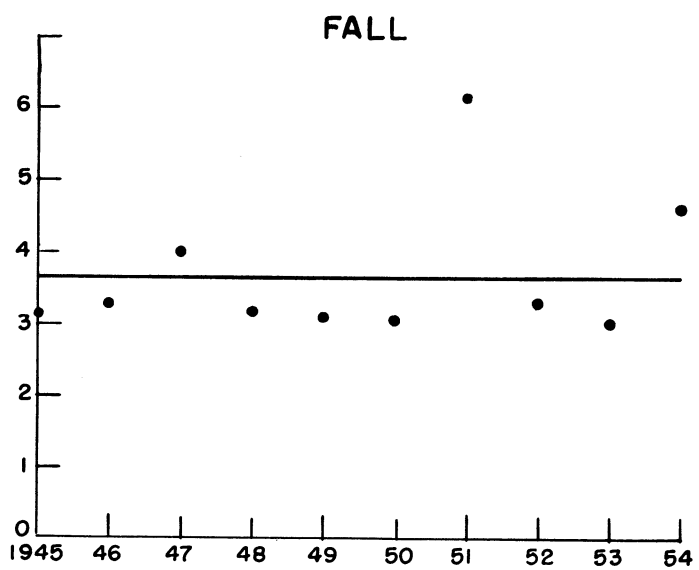


Figure 15. – Variations of Arizona lettuce, price per crate from average of years 1945-54. By seasons 1945-54.

highest average price per crate has been the spring season, with $2.47, followed by the fall season with $2.30, the winter season with $2.26, and the summer season with $2.22.

Seasonal Variation in Prices

Seasonal variation of price per crate and the average crossing date by district for the period 1949-1950 to 1954-1955 is shown in Figure 16. From the above figure it is apparent that there is an inverse relationship between price and shipments with one major exception, that being during the latter part of the spring season when prices and shipments declined together. In general, as shipments increase, price per crate decreases. From this observation it would appear that the Salt River Valley is in a very favorable position. During the spring and fall seasons, price and shipments show a favorable relationship.

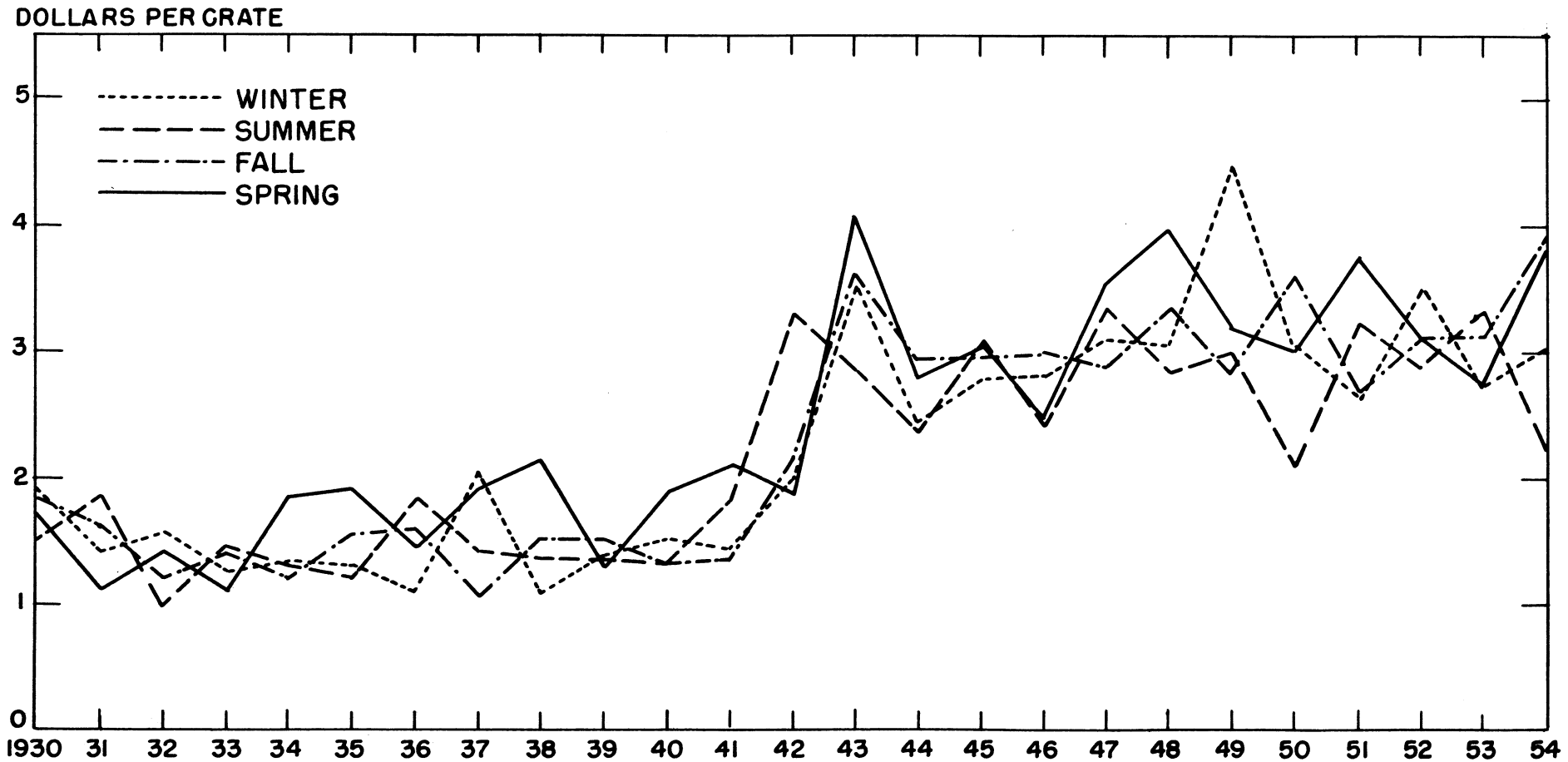


Figure 16.- Price per crate of lettuce received by growers, by seasonal group 1930-1954.

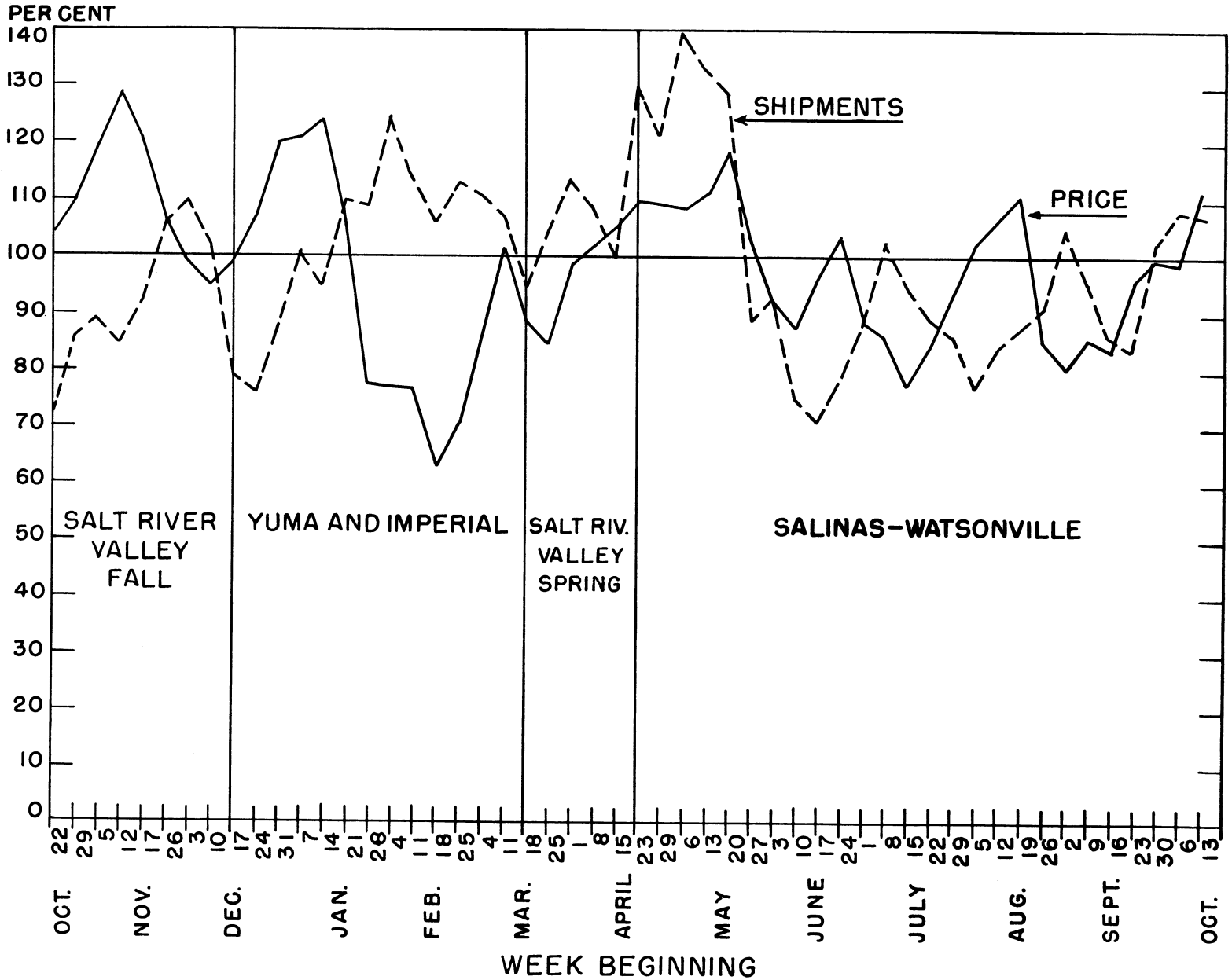


Figure 17. – Percentage of moving average for lettuce price per crate, and carlot shipments, and average crossing dates for years 1949-50 to 1954-55.